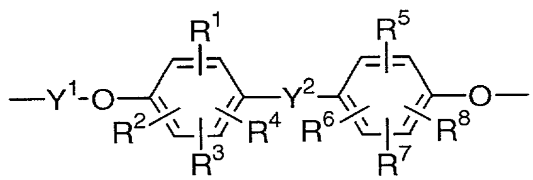
WHAT IS CLAIMED IS:

1. A polyether copolymer comprising (A) an aromatic polyether block and (B) an aliphatic polyether block.

2. The polyether copolymer according to claim 1, wherein (B) an aliphatic polyether block is on a side chain of (A) an aromatic polyether block.

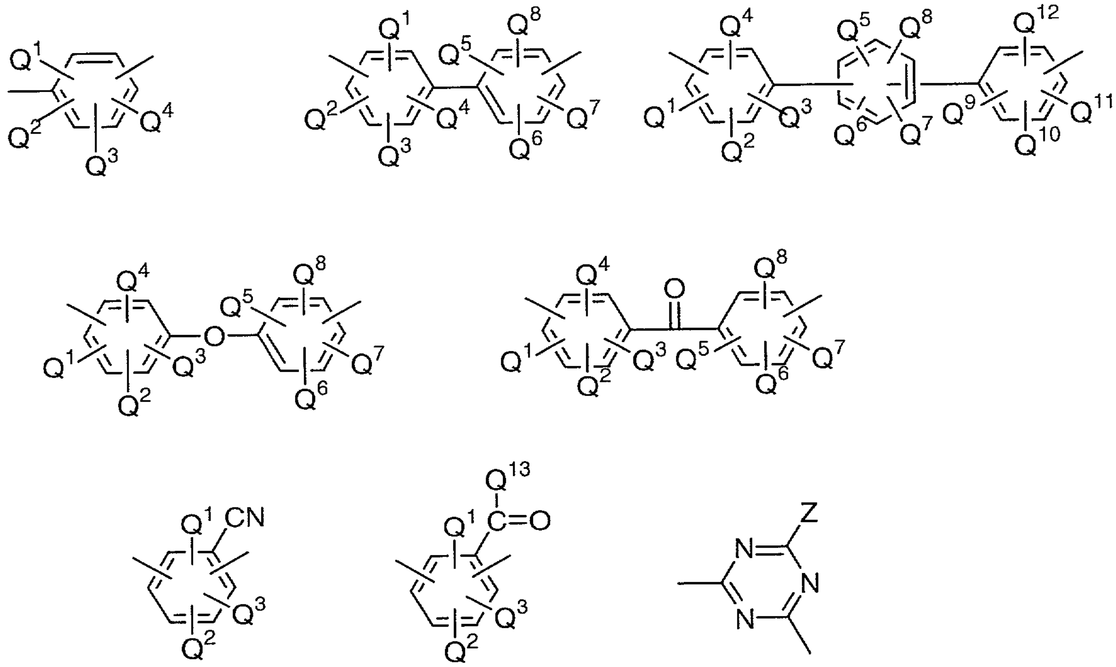
3. The polyether copolymer according to claim 1, wherein the aromatic polyether block (A) has a structural unit represented by the following formula (1):



(1)

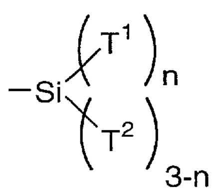
wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7 and R^8 are independently selected from the group consisting of a hydrogen atom, a chlorine atom, an iodine atom, an alkyl group having 1 to 10 carbon atoms, an alkenyl group having 2 to 10 carbon atoms, an alkynyl group having 2 to 10 carbon atoms, a cycloalkyl group having 4 to 10 carbon atoms, a methoxy group, an ethoxy group, a phenyl group which may be substituted and a functional group represented by the formula (2) or (3) described below; Y^1 is selected from any one of functional groups described below or two or more

of the functional groups;



Y^2 is selected from any one of a single bond, a hydrocarbon group having 1 to 20 carbon atoms, an ether group, a ketone group and a sulfone group or two or more of them; at least one of R^1, R^2, R^3, R^4, R^5, R^6, R^7 and R^8 or Q^1, Q^2, Q^3, Q^4, Q^5, Q^6, Q^7, Q^8, Q^9, Q^{10}, Q^{11}, Q^{12} and Q^{13} in at least one unit structure contained in a molecular chain is selected from functional groups represented by the formula (3);
wherein Q^1, Q^2, Q^3, Q^4, Q^5, Q^6, Q^7, Q^8, Q^9, Q^{10}, Q^{11} and Q^{12} are independently selected from the group consisting of a hydrogen atom, an alkyl group having 1 to 10 carbon atoms, an alkenyl group having 2 to 10 carbon atoms, an alkynyl group having 2

to 10 carbon atoms and a functional group represented by the formula (2) or (3) described below; Q^{13} is selected from the group consisting of an alkyl group having 1 to 10 carbon atoms, an alkenyl group having 2 to 10 carbon atoms, an alkynyl group having 2 to 10 carbon atoms and a functional group represented by the formula (2) or (3) described below; Z is selected from the group consisting of a hydrogen atom, a fluorine atom, a chlorine atom, a bromine atom, an iodine atom, a group $-OZ^1$ and a group $-NZ^2Z^3$; and Z^1, Z^2 and Z^3 are independently selected from the group consisting of a hydrogen atom, a saturated or unsaturated hydrocarbon group and an ether bond-containing group;



(2)

wherein T^1 is selected from an alkenyl group having 2 to 10 carbon atoms; T^2 is selected from an alkyl group having 1 to 10 carbon atoms and an aryl group; n represents an integer of 1 to 3 inclusive; plural T^1's may be different from each other and plural T^2's may also be different from each other;

$$-R^9\left(R^{10}O\right)_m R^{11}$$

(3)

wherein R^9 is selected from a single bond and a hydrocarbon group having 1 to 10 carbon atoms; R^{10} is selected from a hydrocarbon group having 1 to 10 carbon atoms; R^{11} is selected from a hydrogen atom and a hydrocarbon group having 1 to 10 carbon atoms; and m is selected from an integer of 1 or more.

4. The polyether copolymer according to claim 3, wherein R^{10} is $-CH_2-CH_2-$, $-CH_2-CH(CH_3)-$ or $-CH(CH_3)-CH_2-$.

5. The polyether copolymer according to claim 1, wherein the relation between the thermal decomposition starting temperature Ta (°C) of the aromatic polyether block (A) and the thermal decomposition starting temperature Tb (°C) of the aliphatic polyether block (B) is represented by the formula: $Ta \geq (Tb + 40)$.

6. A process for producing a polyether copolymer according to claim 1, wherein the process comprises reacting a bisphenol compound corresponding to the material for a moiety of the aromatic polyether block (A), a di-halogenated compound and an aliphatic polyether having an OH group at the terminal and corresponding to the material for a moiety of the aliphatic polyether block (B) in the presence of an alkali.

7. The process according to claim 6, wherein a pre-reaction

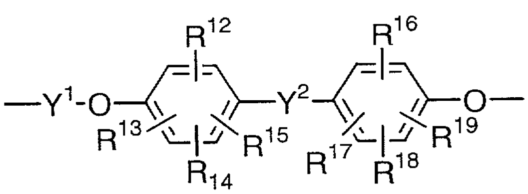
of the di-halogenated compound and the aliphatic polyether having an OH group at the terminal is carried out in the presence of an alkali, then the bisphenol compound and the di-halogenated compound are added to the reaction mixture and the reaction is continued in the presence of an alkali.

8. A process according to claim 1, wherein the process comprises steps of metallizing an aromatic polyether corresponding to a moiety of (A), and carrying out a substitution reaction with a halide of an aliphatic polyether corresponding to a moiety of (B).

9. A coating solution for forming a porous organic film comprising (a) a polyether copolymer according to claim 1 and (b) an organic solvent.

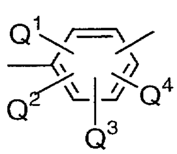
10. A coating solution for forming a porous organic film comprising (c) a resin having a thermosetting functional group, in addition to (a) and (b) according to claim 9.

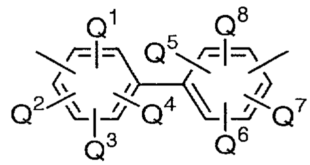
11. The coating solution according to claim 10, wherein the resin having a thermosetting functional group (c) has a unit structure represented by the following formula (4):

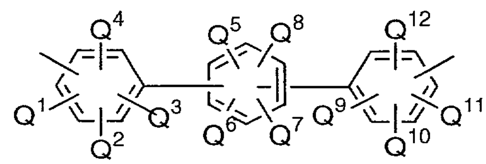


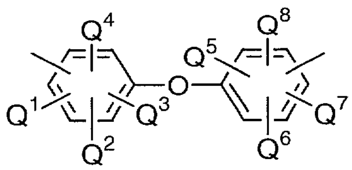
(4)

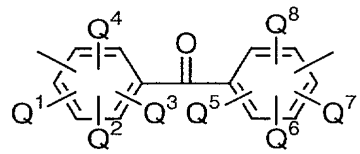
wherein R^{12}, R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18} and R^{19} are independently selected from the group consisting of a hydrogen atom, a chlorine atom, an iodine atom, an alkyl group having 1 to 10 carbon atoms, an alkenyl group having 2 to 10 carbon atoms, an alkynyl group having 2 to 10 carbon atoms, a cycloalkyl group having 4 to 10 carbon atoms, a methoxy group, an ethoxy group, a phenyl group which may be substituted and a functional group represented by the formula (2) described above; Y^1 is selected from any one of functional groups described below or two or more of the functional groups;

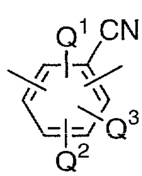


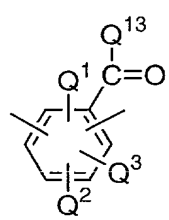


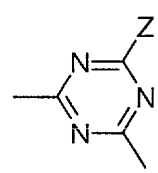












Y^2 is selected from any one of a single bond, a hydrocarbon group having 1 to 20 carbon atoms, an ether group, a ketone

group and a sulfone group or two or more of them; at least one of R^{12}, R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18} and R^{19} or Q^1, Q^2, Q^3, Q^4, Q^5, Q^6, Q^7, Q^8, Q^9, Q^{10}, Q^{11}, Q^{12} and Q^{13} in at least one unit structure contained in a molecular chain is selected from an alkenyl group having 2 to 10 carbon atoms, an alkynyl group having 2 to 10 carbon atoms and a functional group represented by the formula (2) described above;

wherein Q^{14}, Q^{15}, Q^{16}, Q^{17}, Q^{18}, Q^{19}, Q^{20}, Q^{21}, Q^{22}, Q^{23}, Q^{24} and Q^{25} are independently selected from the group consisting of a hydrogen atom, an alkyl group having 1 to 10 carbon atoms, an alkenyl group having 2 to 10 carbon atoms, an alkynyl group having 2 to 10 carbon atoms and a functional groups represented by the formula (2) described above; Q^{26} is selected from the group consisting of an alkyl group having 1 to 10 carbon atoms, an alkenyl group having 2 to 10 carbon atoms, an alkynyl group having 2 to 10 carbon atoms and a functional group represented by the formula (2) described above; and Z, Z^1, Z^2 and Z^3 have the same meaning as described claim 3.

12. The coating solution according to claim 10, wherein the thermal curing reaction starting temperature Tc of the resin having a thermosetting functional group (c) is less than the thermal decomposition starting temperature Tb of the aliphatic polyether block (B).

13. The coating solution according to claim 9, wherein the organic solvent (b) comprises a solvent having an aromatic

ring in its molecule and having a boiling point of 250°C or below.

14. The coating solution according to claim 9, wherein the organic solvent (b) comprises at least one selected from the group consisting of anisole, phenetole and dimethoxybenzene.

15. A process for forming a porous organic film, wherein the process comprises coating a substrate with a coating solution for forming a porous organic film according to claim 9, and carrying out a heat treatment to generate a void at a temperature of not less than the thermal decomposition starting temperature Tb of an aliphatic polyether block and at a temperature of less than the thermal decomposition starting temperature Ta of an aromatic polyether block.

16. A process for forming a porous organic film, wherein the process comprises coating a substrate with a coating solution for forming a porous organic film according to claim 10, then thermally curing the film at a temperature of not less than the thermal curing reaction starting temperature Tc of a resin having a thermosetting functional group and at a temperature of less than the thermal decomposition starting temperature Tb of an aliphatic polyether block, and carrying out a heat treatment to generate a void at a temperature of not less than the thermal decomposition starting temperature Tb of an aliphatic polyether block and at a temperature of less than

the thermal decomposition starting temperature Ta of an aromatic polyether block.